

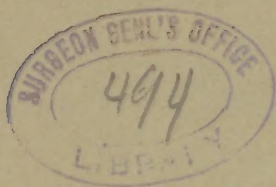
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BY
HENRY LING TAYLOR, M. D.

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ADJUSTED LOCOMOTION IN THE
TREATMENT OF THE RECOVERING STAGE
OF HIP-JOINT DISEASE.*

BY HENRY LING TAYLOR, M. D.

THE tendency of inflammations of the hip joint, whether tubercular or non-tubercular, is toward recovery if conditions favorable to local protection and general nutrition are sufficiently provided. The rubbing and compression of the swollen and congested tissues from muscular spasm and external violence may be prevented by mechanical counter-extension with short periods of recumbency—which relieves undue pressure and sufficiently immobilizes the joint. Traction, unless applied in the line of the deformity produced by spasmodic muscular action, will exert leverage upon the sensitive joint, increasing intra-articular pressure and inflicting additional injury.

A recent case illustrates the prompt relief afforded by properly adjusted counter-traction, where its imperfect application had failed.

* Read before the Section in Orthopædic Surgery of the New York Academy of Medicine, March 20, 1891.

The case was that of a boy who had had lameness and moderate symptoms suggestive of hip disease for at least a year and a half. The invasion, as is so often the case, had been painless and gradual, and eight months had elapsed before the diagnosis was made. He was then furnished with a short traction splint, crutches, and a high sole. He seemed to do well until last October, when he had a fall; he was brought to me in his father's arms, February 16, 1891, still wearing his short splint. His father stated that the boy had been unable to walk for a month, and that during that time he had been kept in the recumbent position with the splint and four-pound weight attached to the leg. He had been growing steadily worse, had lost appetite and flesh, and latterly had moaned and cried out every night. His right hip was so sensitive that he could scarcely bear to be moved or even approached. Examination showed a tender hip joint, rigidly held by muscular spasm in the flexed position. There was some swelling at the anterior and upper portion of the right thigh, and when the limb was moved the adductors stood out like whiplashes. The little fellow, though a thoroughly well-trained child, was in an agony of apprehension over the gentlest manipulation. While deciding what course to pursue, the father took the child away and put him to bed as before with splint and weight, placing, at my suggestion, a pillow under the leg. Five days later he brought him back to place him under my care. He reported that the boy had cried out every night in the mean time, though he had not complained of pain, and examination showed that the flexion had increased to about 45° , and that the leg was considerably adducted. The boy was immediately put to bed, and the long traction splint with the long five-tailed plasters were applied to the leg, which rested in a sling, at an angle of 45° ; the same weight was attached in such a manner as to pull in a line with the suspended leg. The night cries ceased at once and for good, and the boy was immediately relieved of all discomfort. Within a week, without employing other treatment, his appetite had improved, his face lost its anxious expression, and he had already gained flesh; muscular spasm had much diminished, flexion was reduced one half, and the leg was strongly abducted. The child made no objection to

the necessary handling, which evidently caused him no discomfort.

This is a fair sample of the immediate and direct effects following the precise application of mechanical counter-traction* to meet definite indications in the progressive and destructive stage of hip disease. If persisted in until the affected muscles are well relaxed and progressively modified to meet the changing indications, congestion and inflammation usually subside, joint nutrition improves, and the healing process is inaugurated. These facts are well known to American orthopædists, and should be generally appreciated; but the later stages of these cases, in their progress toward cure, present just as definite, though different, indications, which often tax the patience and ingenuity of the surgeon to the utmost.

After the urgent symptoms have subsided and the stage of repair has set in † there ensues a prolonged period during which the healing or recently healed tissues are delicate and vulnerable, and poorly able to endure the shock and strain of unaided locomotion. The joint is free from dis-

* Simple traction by means of a weight and pulley, even when supplemented by recumbency and attempted positive fixation, does not give the same result, as already pointed out in a paper entitled *The Rational Treatment of Hip-joint Disease*, read by title at the meeting of the American Orthopædic Association, Boston, September, 1889, and printed in the *Transactions*, and in the *Times and Register*, Philadelphia, April 26, 1890; and for the knee, in a paper on *A Ready Method for Counter-extension at the Knee*, read at the last meeting in Philadelphia and reprinted in the *Boston Medical and Surgical Journal*, October 16, 1890.

† It is common in chronic osteitis of the hip, knee, and spine for the disease to advance by fits and starts, intervals of latency alternating with exacerbations, and such latent periods should be carefully distinguished from a definitive healing process, which can usually be done by critical examination of the condition of muscular tonicity about the suspected joint.

ease, or in the process of freeing itself from disease, but is weak. The frequent surgical practice at this stage, if I mistake not, has been to allow the patient to be guided by his sensations or inclinations in his attempts at locomotion. In the absence of striking symptoms he may even be encouraged to walk without aid, in spite of distress or disability, especially if no immediately unfavorable result is apparent. In other words, the patient is formally or practically discharged while still in need of surgical aid. Is it not fair to attribute the unsatisfactory ultimate results so frequently observed largely to this neglect of efficient treatment in the later stages? At any rate, we frequently see, after ordinary surgical treatment is discontinued, progressive diminution of motion at the joint, slow but considerable absorption of articular bone, discharging sinuses, disabling and increasing deformity, and not seldom relapses with rekindling of the old inflammation. It is common for patients who have recovered under this plan to have abscesses recur about the joint or in the track of old sinuses, sometimes repeatedly, or after many years, and this may happen when no motion can be detected in the joint. It is reasonable to suppose that there is a considerable period between the time when the joint requires absolute rest and protection, and the time when it can be safely exposed to the traumatism of unrestricted locomotion, which presents its own peculiar indications for treatment. What measures should be employed in this later stage, and how long should they be continued? The practice among those who realize the dangers of premature attempts at unaided locomotion has usually been to continue the use of some form of extension or fixative splint, or crutches and a high shoe for a considerable time, until the vulnerable period is supposed to be past. But this plan, while undoubtedly better than the first mentioned, does not seem to fully meet the indica-

tions, for the prolonged restraint, instead of preparing the joint for the resumption of its functional activity, hinders the reparative process after it has reached a certain point, and, when the weight of the body is finally put upon the joint, the brunt of the strain comes upon delicate, poorly organized, and unresponsive tissues.

These were some of the considerations which led Dr. C. Fayette Taylor, some twenty years ago, to conceive and adopt the plan of treating his cases in the recovering stage of hip disease by locomotion adjusted to their needs. He made the patients walk without allowing the weight of the body to rest upon the joint, though the muscles were freely used and joint motion was not restrained. Whereas, in the stage of active and progressive inflammation, the patient had been either kept from walking or carefully limited, in order that rest in and about the joint should be as complete as possible, in the recovering stage he enabled his patients to walk by the use of the contrivance soon to be described, usually without other aid, in the conviction that the protected use of the joint and of the parts in the functional relation to it was of the greatest aid in equalizing the circulation of the parts, promoting local nutrition, and stimulating the processes of repair to greater energy and perfection. In the first stage walking was permitted, if at all, that it might do the patient good in a general way and without injury to the joint guarded by counter-extension; in the later stages a specially adjusted walking was itself employed as the treatment for the local condition, aside from its indirect and general good effects.

The jointed supporting splint—often known as the “Dows” splint, from the name of the patient for whom it was first used—has a free joint at the knee and ankle, and takes the weight of the body at each step upon a perineal strap. An early form of this apparatus is shown on page

56 (Fig. 15) of Dr. Taylor's monograph *On the Mechanical Treatment of Disease of the Hip Joint*, published * in 1873.

The form used for the last fifteen years is shown in the cut (Fig. 1). The apparatus is made slightly longer than the leg, so that there is about three fourths of an inch space between the heel of the foot and the steel foot-piece, which is riveted into an ordinary shoe (Fig. 2). When the patient walks, his weight is transmitted by a perineal

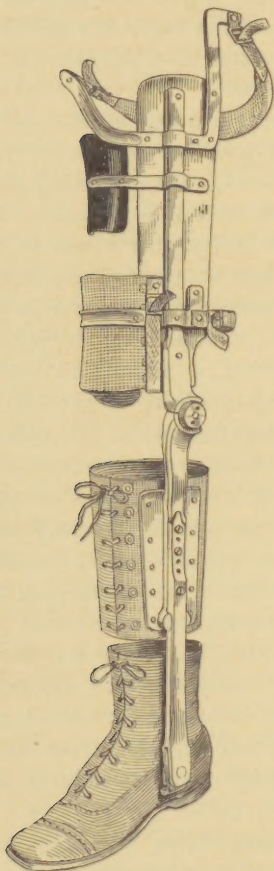


FIG. 1.

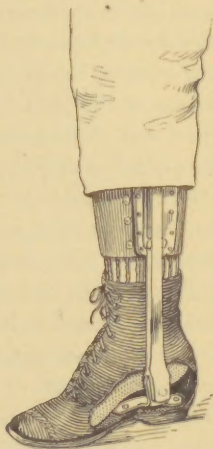


FIG. 2.

strap through the splint to the foot-piece and ground, his leg being suspended free of the shoe at the heel at every part of

* William Wood & Co., New York, 1873.

the step. The apparatus is connected with the foot-piece by a slip-joint, so that the shoe can be removed without disturbing the brace. The weight of the apparatus is taken

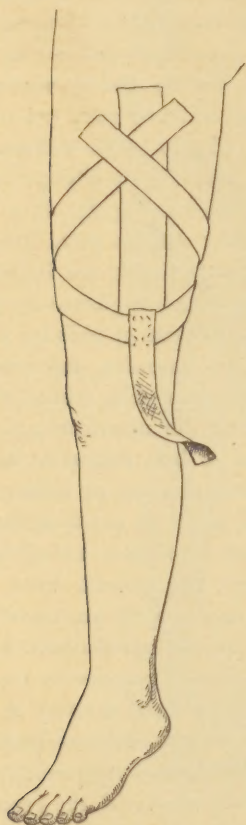


FIG. 3.

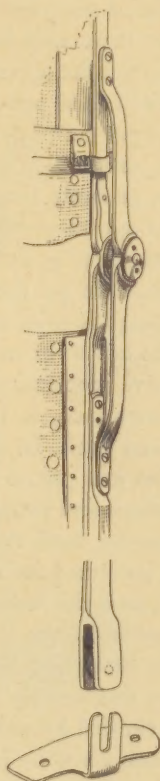


FIG. 4.

by a three-tailed or five-tailed adhesive plaster (Fig. 3) applied to the thigh, which also acts as a mild counter-extend-

ing force. As to construction, the apparatus must be, first of all, sufficiently rigid to take the weight of the body without yielding, as it is of the utmost importance that there should be such instinctive confidence in its solidity that the muscles should never be solicited to "stand guard." The best of materials and workmanship should be employed, so that there may be no lost motion and no unnecessary weight, and the apparatus must be fitted with exactness to each individual patient. In order to obtain stiffness with economy of material, the knee joint is often strengthened by a truss construction for heavy patients (Fig. 4). It is, nevertheless, perfectly feasible to carry out the same principles with an apparatus of comparatively simple and inexpensive construction (Fig. 5). By means of this appliance the patient is enabled to go through the motions of walking without subjecting the joint to weight or concussion, and freely enjoys the benefit of moderate exercise while stimulating the reparative processes and training the neuromuscular apparatus concerned, to its normal or best attainable development and use. In the progressive stage of inflammation the joint was put to rest and, as far as possible, deprived of intrinsic and extrinsic stimuli by a positive stretching of the muscles until they relaxed; the muscles were, so to speak, paralyzed for the time and atrophy was encouraged. When, after the restoration of physiological conditions, repair has set in, the joint is allowed to resume its functions little by little, and led back to its usual activity in a systematic and orderly manner. Motion without pressure is first permitted by walking on the jointed supporting splint; afterward, when the joint has fully recovered, the pressure is permitted by gradually allowing the patient's heel to come down upon the sole of the shoe as the side-bar of the apparatus is shortened or the perineal strap is slackened. It will be seen that this plan meets the requirements of the re-

covering stage by favoring better repair and by preparing the lately diseased or disused parts for the considerable

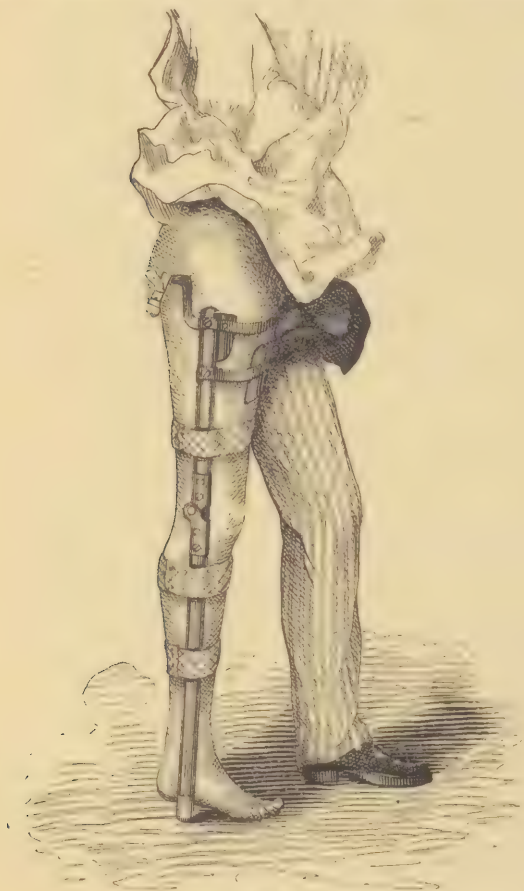


FIG. 5.

strain that is sure to come upon them on the resumption of full functional activity. It is often advisable that this pro-

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fecting and developing process should be continued for several years, during which the patient may often be permitted to go about quite freely and attend school or engage in his ordinary occupations, while the apparatus gives him no inconvenience and, being worn under his ordinary clothing, is scarcely noticeable. Mechanically-adjusted locomotion is so little irksome that the surgeon is made independent of time, and may continue it so long as the interests of the patient demand it. The object of the treatment is to restore the joint and limb to the best use attainable by providing favorable conditions for so long as may be necessary in order to secure the best ultimate and permanent result, and treatment is often prolonged, not because the patient is doing badly, but because he is doing well, and better repair and use are striven for than would be possible were the patient dismissed. Some of the best results have been secured after the longest periods of treatment. I am satisfied that cases of hip disease are often left to shift for themselves much too early, and that deformity, disability, deterioration, and relapse are more frequent than they should be.

While the plan of encouraging repair and developing function under protected use is being carried out, special indications often arise which require other adjustments in the locomotor mechanism besides the elimination of weight and pressure.

In cases of long standing, especially when there has been considerable loss of articular bone, or limitation of motion, the muscles, from disuse or previous irritation, often lose their elasticity and become rigid, and the conditions are such as to favor a dynamical equilibrium in adduction, particularly when there is erosion of the head of the femur and luxation or subluxation at the joint.

I am not now speaking of the adduction from spasm in the acute stage, but of the adduction remaining after its sub-

sidence or from some of the causes alluded to. This later adduction may be excessively persistent and difficult to handle, and I have already spoken of its mechanical treatment in a paper read before this Section two years ago.*

In these late and severe cases, after the adduction is overcome by quite rapid stretching in bed, the patient is allowed to walk about with an apparatus which holds the leg straight or slightly abducted under all circumstances. Motion inward is stopped by a perineal crutch bearing in the opposite groin, jointed to the knee-plate on the inner side of the apparatus, and arranged to limit or stop the inward motion of the thigh, and, if need be, take most of the pressure in walking on the groin opposite to the affected side, and so make the act of locomotion combat the abnormal tendency.

It is sometimes necessary to place and hold the leg in this fashion even after the perineal strap is dispensed with and the weight is allowed to come upon the joint. The various means used to accomplish this object have already been described † and the apparatus exhibited.

It may be necessary in a few cases to modify locomotion to meet the requirements of other distortions, such as abduction and rotation, by appropriate means. The point is to let the patient have the use, so soon as he is ready for it, of those elements of locomotion which are beneficial or can be made to be beneficial, and to eliminate deleterious elements. One kind of walking may be very harmful, another just as beneficial. A modification of our prescription or its dosage may determine an opposite result.

As the patient gains strength and dexterity he may be allowed to gradually resume in proper order the elements which have been withheld. Locomotion is thus seen to be

* The Prevention and Treatment of Crural Adduction. *The Medical News*, March 23, 1889.

† *Loc. cit.*

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susceptible of analysis for therapeutic purposes, and one or more of its elements may be prescribed and its dosage regulated, as in any other therapeutic measure.

In the most active stage of disease we not only abolish locomotion altogether, but add recumbency in the proper position to eliminate all demands upon the joint, and furnish positive counter-extension to protect the joint from spasm and undue pressure. Later we may allow locomotion with the well leg only, the patient being on crutches; still later, locomotion on a stiff counter-extending splint, which does not permit the foot to touch the ground. When morbid action is on the decline, we permit motion to the affected leg, but without pressure, using for this purpose the jointed supporting splint, with or without crutches or cane, according to the ability of the patient and the amount of exercise indicated. Later still we may modify locomotion so as to make it assist in counteracting certain deformities,* especially persistent adduction, and we may do this with or without perineal support on the affected side, according to the necessity of the case. And it must be remembered that locomotion in one plane is simpler than locomotion free from lateral restraint, so that the use of the abduction crutch, which practically means locomotion with free flexion and extension only, may be indicated in cases not yet ready for the simple "Dows," even if not much tendency to adduction is present.

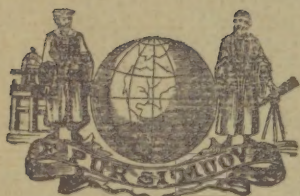
The mechanical side of these problems has been sufficiently worked out by Dr. C. Fayette Taylor to enable us to give our patients just the kind of assistance in walking that they require, and his practice has always been to allow the patient to use the joint as much as can be done with safety, and to make that use of such a kind as to contribute to the

* Much as in the treatment of club-foot, after correction has passed a certain point, the weight of the body in locomotion assists correction.

development of the powers of the joint and its restoration to usefulness.

The subject of the therapeutic application of adjusted locomotion is a very broad one, which finds its practical application in most of the affections of the lower extremities with which the orthopædist has to deal ; but the purpose of this paper is mainly to urge the importance of its scientific application to the amelioration of the conditions following the acute stages of hip disease. The method and apparatus are, however, applicable in disability at the hip joint from other causes, such as excision, ununited fracture, etc., and there is a fruitful field for the practical application of the principles involved. In the treatment of hip disease this plan has seemed to secure, wherever thoroughly and intelligently carried out, greater comfort and freedom of the patient during a large part of the treatment ; frequently, I am convinced, less destruction of the joint structures, more motion, more perfect repair, better position, and a better ultimate use of the limb, and in some instances there has been improvement in amount of motion and usefulness, continuing for a considerable time after the discharge of the patient.

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